NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

WETLAND RESTORATION

(Ac.)

CODE 657

DEFINITION

The rehabilitation of a degraded wetland or the reestablishment of a wetland so that soils, hydrology, vegetative community, and habitat are a close approximation of the original natural condition that existed prior to modification to the extent practicable.

PURPOSE

To restore wetland function, value, habitat, diversity, and capacity to a close approximation of the pre-disturbance by:

- Restoring hydric soil
- Restoring hydrology (depth duration and season of inundation, and/or duration and season of soil saturation).
- Restoring native vegetation (including the removal of undesired species, and/or seeding or planting of desired species).

CONDITIONS WHERE PRACTICE APPLIES

The practice applies only to natural wetland sites with hydric soils, or problem soils that are hydric, which have been subject to hydrologic or vegetative degradation, or to sites where hydric soils are covered by fill, sediment, or other deposits.

The practice is applicable only where the natural hydrologic conditions, including the hydroperiods, occurs or can be approximated by modifying drainage and/or by artificial flooding of a duration and frequency similar to the original, natural conditions.

The practice does not apply:

- to treat point and non-point sources of water pollution (Constructed Wetland - 656);
- to modify an existing wetland where specific attributes are heightened by management objectives, and/or returning a degraded wetland back to a wetland but to a different type than what previously existed on the site (Wetland Enhancement - 659);
- to creating a wetland on a site location which historically was not a wetland (Wetland Creation - 658).

CRITERIA

General Criteria Applicable to All Purposes

The purpose, goals and objectives of the restoration shall be clearly outlined, including soils, hydrology and vegetation criteria that are to be met and are appropriate for the site and the project purposes.

The soil, hydrology and vegetative characteristics existing on the site and the contributing watershed shall be documented before restoration of the site begins.

The nutrient and pesticide tolerance of the species planned shall be considered where known nutrient and pesticide contamination exists.

Upon completion of the restoration, the site shall meet soil, hydrology, vegetation and habitat conditions of the wetland that previously existed on the site before alteration to the extent practicable.

Where offsite drainage has had an impact on the site (e.g. main ditches, channelized streams, levees), the design shall compensate for these landscape changes (e.g., increased water depth, berms or microtopography).

Sites suspected of containing hazardous waste shall be tested to identify appropriate remedial measures. Sites containing hazardous material shall be cleaned prior to the installation of this practice.

Invasive species, federal/state listed noxious plant species, and nuisance species (e.g., those whose presence or overpopulation jeopardize the practice) shall be controlled on the site. This includes the manipulation of water levels to control unwanted vegetation. The establishment and/or use of non-native plant species shall be discouraged where possible.

Where adjoining land is used for grazing or is open to livestock, the wetland shall be fenced to exclude the livestock. If grazing is planned in the wetland area, a prescribed grazing plan will be developed to ensure the planned wetland functions are maintained. See Prescribed Grazing (528A) standard.

Criteria for Hydric Soil Restoration

Restoration sites will be located on hydric soils, or on problem soil areas that are hydric.

If the hydric soil is covered by fill, sediment, spoil, or other depositional material, the material covering the hydric soil shall, to the extent technically feasible, be removed.

Criteria for Hydrology Restoration

The hydrology (including the timing of inflow and outflow, duration, and frequency) and hydroperiod of the restored site shall approximate the conditions that existed before alteration. This includes hydrology modification caused by roads, ditches, drains, terraces, etc. within the watershed.

To the extent technically feasible reestablish topographic relief and/or microtopography. Use reference sites within the area to determine desired topographic relief. For more information and specifications for microtopography restoration see Illinois Biology Technical Note #20 “using Micro and Macrotopography in Wetland Restoration”.

Excavations from within the wetland shall remove sediment to approximate the original topography and/or microtopography or establish a water level that will compensate for the sediment that remains.

Existing drainage systems will be utilized, removed or modified as needed to achieve the intended purpose.

The work associated with the wetland shall not adversely affect adjacent properties or other water users unless agreed to by signed written letter, easement or permit.

A natural water supply should be used to reestablish the site’s hydrology and that will support the wetland type. If this is not possible, an artificial water supply can be used; however, these sources shall not be diverted from other wetland resources (e.g. prairie pothole wetland complexes or springs).

Criteria for Vegetative Restoration

Hydrophytic vegetation restoration shall be of species typical for the wetland type(s) being established. Preference shall be given to native wetland plants with localized genetic material.

Where natural colonization of pre-identified, selected species will realistically dominate within 5 years, sites may be left to revegetate naturally. If a site has not become dominated by the targeted species within 5 years, active forms of revegetation may be required.

Adequate substrate material and site preparation necessary for proper establishment of the selected plant species shall be included in the design.

Where planting and/or seeding is necessary, the minimum number of native species to be established shall be based upon the type of vegetative communities present and the vegetation type planned:

- Where the dominant vegetation will be herbaceous community types, a subset of the original vegetative community shall be established within 5 years; or, a suitable precursor to the original community will be established within 5 years that creates conditions suitable for the establishment of the native community. Species richness

shall be addressed in the planning of herbaceous communities.

- Where the dominant vegetation will be forest or woodland community types, vegetation establishment will include a minimum of six species.

Seeding rates shall be based upon percentage of pure live seed that shall be tested within 6 months of planting.

Preference shall be given to native wetland plants with localized genetic material. Plant materials collected or grown from material collected within a 200-mile radius from the site are considered local ecotypes.

Tree establishment seed planting rates and site preparation will meet the criteria of Conservation Practice Woodland Direct Seeding (652). Seed viability will be determined prior to planting.

Tree (and shrub) planting will follow the criteria of Conservation Practice Standard Tree/Shrub Establishment (612).

Trees will be planted on the contour to facilitate placing the appropriate species at the contour which will have the optimum depth and duration of inundation.

Five years after planting, a bottomland hardwood restoration site shall have at least 100 hard mast and 100 soft mast stems per acre. Exceptions may be made for sites where root pruned container stock is used. Follow Tree and Shrub Establishment Standard (612) for specification regarding the use of root pruned stock.

CONSIDERATIONS

For wildlife purposes, planting density and stocking rates are generally expected to be lower than for production purposes, and that the selection of species will generally be different than those used for production purposes.

Consider microtopography and hydroperiod when determining which species to plant.

On sites where woody vegetation will dominate, consider adding 1 to 2 dead snags, tree stumps or logs per acre to provide structure and cover for wildlife and a carbon source for food chain support.

Consider impact that water surface draw-downs will have on concentrating aquatic species such as turtles into diminished pool areas resulting in increased mortality.

Existing wetland functions and/or values will be impacted by the practice. Consider effects on existing wetlands and water-related resources, including fish and wildlife habitats, which will be associated with the practice.

Restoration may impact the abundance of disease vectors such as mosquitoes.

The practice may affect volumes and rates of runoff, infiltration, evaporation and transpiration changing the water budget for the site.

Consider effects on downstream flows or aquifers that would affect other water uses or users.

Water control structures may affect the ability of fish or other aquatic species to move in and out of the wetland.

Consider establishing herbaceous vegetation by a variety of methods over the entire site, or a portion of the site, and at densities and depths appropriate.

Link wetlands by vegetative corridors wherever appropriate to enhance the wetland's use and colonization by the native flora and fauna.

Establish vegetative buffers on surrounding uplands to reduce sediment and soluble and sediment-attached substance carried by runoff and/or wind and provide refuge and nesting habitat for wildlife.

Consider effects on temperature of water resources to prevent undesired effects on aquatic and wildlife communities.

Soil disturbance may increase the probability of invasion by unwanted species.

For discharge wetlands, consider underground upslope water and/or groundwater source availability.

Control water levels where possible to prevent oxidation of organic soils and inundated organic matter and materials.

PLANS AND SPECIFICATIONS

Specifications for the practice shall be prepared for each site. Specifications shall be recorded using approved specifications sheets, job sheets, narrative statements in the conservation plan, or other documentation. Requirements for the operation and maintenance of the practice shall be incorporated into site specifications. Plans and specifications should be reviewed by staff with appropriate training in design and implementation of wetland restoration.

Specifications for Subsurface Drain Removal or Destruction

The effects of a subsurface drainage system may be eliminated by performing one or more of the following:

- removing or rendering inoperable a portion of the drain,
- modifying the drain with a water control device, or
- Installing non-perforated pipe through the wetland site.

A subsurface drain shall be modified to preclude draining the wetland site by removal, plugging, adding a water control structure or replacement with solid tile of all drain tile closer to the wetland than the minimum distance shown in Table 1. If present, within the distance in Table 1 sumps for drainage pumping plants shall be removed, or filled and capped according to state law.

If present, all sand and gravel bedding and filtering material or other flow enhancing material will also be removed. The trench will be filled or compacted to achieve a density equal to the adjacent material.

Where embankments will be constructed, all subsurface drains shall be removed starting at one-half the minimum distance shown on Table 1 downstream of the embankment center line and extending to 15 feet upstream from the upstream toe of the embankment. Or, the drain under the embankment shall be removed and a structure excavation with a 4 foot bottom width and not less than 1:1 side slopes shall be extended to one foot below the invert elevation of the drain, under the fill. The drain can be reinstalled (non-perforated material only) and the back fill in the trench shall be compacted in six inch or smaller lifts, to the original ground elevation.

Installation of non-perforated subsurface drain around or through the wetland may be necessary to allow upstream drainage systems to continue to function properly.

Functional subsurface drains downstream of the wetland shall have an end cap installed on the upstream end or other satisfactory end seal installed to prevent soil from filling the drain.

Specifications for Surface Drain Filling

Where open channels and shallow surface drains provide surface and subsurface drainage, the channel or surface drain will be:

- Totally filled with earth, or
- Filled with a single ditch plug or a series of ditch plugs to the full depth of the ditch according to Table 1, or
- Filled with a ditch plug to a height less than the full depth of the ditch according to Table 1 and have an outlet designed according to NRCS Standard Grade Stabilization Structure (410) or, Structure for Water Control (587).
- Ditch plugs will begin not closer to the wetland than the minimum distance in Table 1.

Where open channels and shallow surface drains provide only surface drainage, restoration may be achieved using an embankment. See criteria for Embankments.

Plan the number and spacing of ditch plugs based on an evaluation of land grade, drain grade, and depth of the drainage ditch. The end slopes on ditch plugs will be 3:1 or flatter on the down-stream side and 5:1 or flatter on the wetland side.

All fill will be compacted as needed to achieve the desired densities. To account for settlement, the earth fill height will be increased by at least 5% for mineral soils compacted by construction equipment operating over the fill area, and by at least 10% where fill is dumped, bulldozed, and shaped with limited compaction. The earth fill height will be increased by 20% where a

mixture of mineral and organic soils is used. All fills using organic soils shall be increased by at least 33% to account for settlement.

Provisions will be made to store, pass, or divert the flow so that it does not cause erosion and flooding impacts where the flow enters any downstream facilities. Earth fill materials shall be placed such that there will be no flow over the ditch plug except where a grade stabilization structure or structure for water control is used. Earth fill materials shall be placed such that there will be no flow over the ditch plug. A minimum of 0.5 feet shall be included in the settled fill height of a ditch plug above the adjacent original ground surface for freeboard to insure that flows will be directed around the plug. A flow control device will be used where flow duration and rate would otherwise cause erosion and head cutting.

Table 1

Minimum length of subsurface drain to be removed or rendered inoperable
or
Minimum length of surface drain to be filled with ditch plug. (The length is measured parallel to the direction of the surface drain flow along the top of the settled ditch plug.)

*Soil Permeability (inches per hour)	*Soil Texture	**Minimum Distance from Wetland
> 2.0	Sandy & Organics	150 feet
0.6 - 2.0	Loamy	100 feet
< 0.6	Clayey	50 feet

* Soil Texture and permeability are for the general soil profile, not just the surface layer. Where the permeability and texture vary throughout the profile, consider the type of drainage system and which layer(s) are critical. Standard values for permeability and texture for each soil map unit are in the Field Office Technical Guide.

** Lateral effects of drainage features computed according to EFH Chapter 19 procedures can be substituted for the minimum distances shown in Table 1 (except for drains under embankments).

Specifications for Embankments

Earth embankments and appurtenances shall meet the requirements of Dikes (356), Ponds (378), Grade Stabilization Structure (410) and/or structure for Water Control (587), as applicable.

Embankments located on a floodplain, where overtopping of the embankment by flow from the floodway into the wetland is likely, may have the vegetated spillway area on level natural ground, in excavation, or on an area of the embankment where the height from the top of the embankment to the downstream toe is 2 feet or less. The embankment spillway area should have an embankment top width of 25 feet and a level section width of 100 feet as minimums. The design flow depth should be 0.5 feet or less. The embankment side slopes should be 5:1 or flatter in this area. Mulching or other types of mechanical protection should be required on embankment type spillways.

OPERATION AND MAINTENANCE

The following actions shall be carried out to insure that this practice functions as intended throughout its expected life. These actions include normal repetitive activities in the application and use of the practice (operation), and repair and upkeep of the practice (maintenance):

Any use of fertilizers, mechanical treatments, prescribed burning, pesticides and other chemicals shall assure that the intended purpose of the wetland restoration shall not be compromised;

Establish an inspection schedule for embankments and structures for damage assessment;

The depth of accumulated sediment should be measured and the accumulations removed when the planned project objectives are jeopardized.

Management actions shall maintain vegetation, and control undesirable vegetation.

Biological control of undesirable plant species and pests (e.g., using predator or parasitic

species) shall be implemented where available and feasible;

For wildlife habitat purposes, haying and grazing, if justified as a necessary wildlife/wetland management tool, can be used for management of vegetation. Disturbance to ground nesting species shall be minimized.

The control of water depth and duration may be utilized to control unwanted vegetation.

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